## CLASSIFICATION OF ILLNESSES ATTRIBUTABLE TO FOODS

(A CLASSIFICATION BY SYMPTOMS, INCUBATION PERIODS, AND TYPES OF AGENTS<sup>1,2</sup>)

DISEASE

ETIOLOGIC AGENT AND

aureus, staphylococci

from skin, nose &

lesions of infected

humans and animals

and from udders of cows

INCUBATION OR LATENCY

SIGNS & SYMPTOMS

FOODS INVOLVED<sup>3</sup> SPECIMENS TO COLLECT FACTORS THAT CONTRIBUTE

with infections containing pus, holding

foods at warm (bacterial incubating)

temperatures, fermentation of

abnormally low-acid foods

OUTBREAKS

# <u>UPPER GASTROINTESTINAL TRACT SIGNS AND SYMPTOMS (NAUSEA, VOMITING) OCCUR FIRST OR PREDOMINATE</u>

## INCUBATION (LATENCY) PERIOD USUALLY LESS THAN ONE HOUR FUNGAL AGENTS

Gastrointest- inal irritating group mush- room poisoning	Possibly resin- like substances in some mushrooms (mushroom species are different than those cite on pp &)		Nausea, vomiting, retching, diarrhea, abdominal	Many varieties of wild mushrooms	Vomitus	Eating unknown varieties of mushrooms, mistaking toxic mushrooms for edible varieties
			CHEMICAI	LAGENTS		
Antimony Poisoning	Antimony in gray enamelware	Few minutes to 1 hour	Vomiting, abdominal pain, diarrhea	High-acid foods and beverages	Vomitus, stools, urine	Using/buying antimony-containing utensils, storing high-acid foods in gray enamelware
Cadmium Poisoning	Cadmium in plated utensils	15 to 30 minutes	Nausea, vomiting, abdominal cramps, diarrhea, shock	High-acid foods & beverages, candy love beads or cake decorations	Vomitus, stools, urine, blood	Using/buying cadmium-containing utensils, storing high-acid foods in cadmium-containers, ingesting cadmium-containing foods
Copper Poisoning	Copper in pipes and utensils, old dairy white metal	Few minutes to few hours	Metallic taste, nausea, vomiting (green vomitus), abdominal pain, diarrhea	High-acid foods and beverages, ice cream (ices) and beverages.	Vomitus, gastric washings, urine, blood	Storing high-acid foods in copper utensils or using copper pipes for dispensing high-acid beverages, faulty back-flow prevention valves in vending machines
Fluoride poisoning	Sodium fluoride in insecticides	Few minutes to two hours	Salty or soapy taste, numbness of mouth, vomiting, diarrhea, abdominal pain, pallor, cyanosis dilated pupils, spasms, collapse, shock	Any accidentally contaminated food, particularly dry foods, such as dry milk, flour, baking powder & cake mixes	Vomitus, gastric washings	Storing insecticides in same area as foods, mistaking pesticides for powdered foods
Lead poisoning	Lead in earthenware pesticides, putty, plaster, cans with lead solder seams	30 minutes or longer	Mouth and abdominal pain, milky vomitus, black or bloody stools, foul breath, shock blue gum line	Beverages stored in lead containing vessels, any accidentally contaminated food	Washings, stools, blood, urine	Storing high-acid foods in lead-containing vessels, storing pesticides in same area as food, imported canned high-acid foods with faulty seams
Tin poisoning	Tin in tinned cans	30 minutes to two hours	Bloating, nausea, vomiting, abdominal cramps, diarrhea, headache	High-acid foods and beverages	Vomitus, stools, urine, blood	Using uncoated tin containers for storing acidic foods. Very high tin concentrations are required to cause illness.
Zinc poisoning	Zinc in galvanized containers	Few minutes to few hours	Mouth and abdominal pain, nausea, vomiting, dizziness	High-acid foods and beverages	Vomitus, gastric washings, urine, blood, stools	storing high-acid foods in galvanized cans
		INCUB	ATION (LATENCY BACTERIA)		HOURS	
Bacillus cereus Gastroenteritis (emetic form, mimics staphylococcal intoxication)	Exotoxin of <i>B. cereus</i> organism in soil (strains differ from diarrheal form)	0.5 to 5 hours	Nausea, vomiting, occasionally diarrhea	Boiled or fried rice, pasta, cooked commeal dishes, porridge	Vomitus, stool	Storing cooked foods at room temperature, storing cooked foods in large containers in refrigerators, preparing foods several hours before serving
Staphylococcal intoxication	Exo-enterotoxins A, B, C, D & E of Staphylococcus aureus staphylococci	1 to 8 hours, mean 2 to 4 hours	Nausea, vomiting, retching, abdominal pain, diarrhea, prostration	Lower water activity foods (a <sub>w</sub> ), e.g. cheese, whipped butter ham meat	Vomitus, stools, rectal swabs, carriers nasal swabs of	Inadequate refrigeration, workers touching cooked food, preparing food several hours before serving, workers with infections containing our holding

butter, ham, meat

& poultry products,

cream filled pastry,

food mixtures,

prostration

leftovers, dry milk

swabs, swabs of

lesions, anal swab

### CHEMICAL AGENTS

Using excessive amounts of nitrites or Blood Nitrite poisoning<sup>4</sup> Nitrites or nitrates Nausea, vomiting, Cured meats, any 1 to 2 hours nitrates in foods for curing or for accidentally concyanosis, headache, used as meat covering up spoilage, mistaking dizziness, weakness, taminated food curing compounds nitrites for common salt and other exposed to excessive loss of consciousor ground water condiments, improper refrigeration nitrification ness, chocolate from shallow wells of fresh foods. brown colored blood<sup>4</sup> TOXIC ANIMALS Harvesting shellfish from waters with Gastric washings Mussels, clams, 0.5 to 12 hours Diarrhea, nausea, Okadaic acid and Diarrhetic high concentration of Dinophysis vomiting, abdominal scallops commonly < 3 hrs shellfish other toxins cramps, chills, fever, produced by dinopoisoning (DSP) headache flagellates, Dinophysis acuminata and other species INCUBATION (LATENCY) PERIOD USUALLY 7 TO 12 HOURS FUNGAL AGENTS Eating certain species of Amanita, Urine, blood, Abdominal pain, Amanita phalloides Cyclopeptides and 6 to 24 hours Cyclopeptide and Galerina, and Gyromitra mushrooms, feeling of fullness, A. verna, Galerina Gyromitrin in some average 6 - 15 h vomitus Gyromitrin groups eating unknown varieties of mushvomiting, protracted antumnalis, Gyromitra of mushroom mushrooms rooms, mistaking toxic mushrooms diarrhea, loss of esculenta (false poisoning for edible varieties morels) and similar strength, thirst, species of mushrooms muscle cramps, feeble rapid pulse, collapse, jaundice, drowsiness, dilated pupils, coma, death BURNING MOUTH, SORE THROAT AND RESPIRATORY SIGNS AND SYMPTOMS OCCUR INCUBATION (LATENCY) PERIOD LESS THAN 1 HOUR CHEMICAL AGENTS Burning lips, Splashing of freezing mixture Vomitus Few minutes Frozen dessert Calcium chloride Calcium chloride onto popsicles while freezing; Poisoning freezing mixture for mouth, throat, bar cracks in molds allowing CaCl<sub>2</sub> vomiting Frozen dessert bars to penetrate popsicle syrup Inadequate rinsing of bottles cleaned Vomitus Few minutes Bottled beverages Burning of lips, mouth, Sodium hydroxide in Sodium hydroxide with caustic and throat; vomiting, bottle washing compoisoning diarrhea, abdominal pounds, detergents, pain drain cleaners or hair straighteners INCUBATION (LATENCY) PERIOD 12 TO 72 HOURS

## BACTERIAL AGENTS

Raw milk, foods

containing eggs

Throat swabs,

vomitus

Workers touching cooked foods,

workers with infections containing pus,

inadequate refrigeration, inadequate

cooking or reheating, preparing foods

several hours before serving LOWER GASTROINTESTINAL TRACT SIGNS AND SYMPTOMS (ABDOMINAL CRAMPS, DIARRHEA)

Sore throat, fever,

nausea, vomiting,

rhinorrhea, some-

times a rash

1 to 3 days

Beta-hemolytic

streptococcal

infections

Streptococcus

pyrogenes from

throat and lesions

infected humans,

in soil

other animals, and

of infected humans

# OCCUR FIRST OR PREDOMINATE

## INCUBATION (LATENCY) PERIOD USUALLY 7 TO 12 HOURS BACTERIAL AGENTS

Nausea, abdominal Inadequate refrigeration, holding of Cereal products, Stools, vomitus 6 to 16 hours Enterotoxin of B. Bacillus cereus foods at warm (bacterial incubation) pain, diarrhea, some custards, sauces, enteritis (diarrheal cereus. soil temperatures, preparing foods several starchy foods, e.g. reports of vomiting form, mimics C. organism (strain hours before serving, inadequate differs from emetic perfringens) pasta, potatoes, reheating of leftovers and meatloaf form) Abdominal pain, Inadequate refrigeration, holding foods Cooked meat, Stools 8 to 22 hours, Clostridium Endo-enterotoxin at warm (bacterial incubation) tempdiarrhea formed during mean 10 hours poultry, gravy, perfringens eratures, preparing foods several sporulation of C. sauces and gastroenteritis hours before serving, inadequate perfringens in soups reheating of leftovers intestines, organism in feces of

# INCUBATION (LATENCY) PERIOD USUALLY 12 TO 72 HOURS BACTERIAL AGENTS

Aeromonas diarrhea	Aeromonas hydro- phila	1 to 2 days	Water diarrhea, abdominal pain, nausea, chills, headache	Fish, shellfish, snails, water	Stools	Contamination of foods by sea or surface water
Campylobacter-iosis	Campylobacter jejuni	2 to 7 days, mean 3 to 5 days	Diarrhea, (often bloody), severe abdominal pain, fever anorexia, malaise, headache, vomiting	Raw milk, raw clams and shellfish, water poultry and meat	Stools, rectal swab, blood	Drinking raw milk, eating raw or undercooked shellfish, inadequate cooking or pasteurization
Cholera	Endemic in temperate U.S. coastal sea water. <i>V.cholerae</i> serogroup 01 classical and El Tor biotypes; serogroup O139	1 to 5 days, usually 2 - 3 days	Profuse, watery diarrhea (rice-water stools), vomiting abdominal pain, dehydration, thirst, collapse, reduced skin turgor, wrinkled fingers, sunken eyes, acidosis	Raw fish & shellfish foods washed or prepared with contaminated water	Stools, rectal swabs	Obtaining fish & shellfish from sewage contaminated waters in endemic areas, poor personal hygiene, infected workers touching foods, inadequate cooking, using contaminated water to wash or freshen foods, inadequate sewage disposal, using night soil as fertilizer
Cholera-like vibrio gastroenteritis	Non 01/O139  V. cholerae,& related species, eg, V. mimicus, V. fluviallis, V. hollisae	2 to 3 days	Watery diarrhea (varies from loose stools to choleralike diarrhea)	Raw shellfish, raw fish	Stools, rectal swabs	Eating raw shellfish or raw fish, inadequate cooking, cross contamination
Pathogenic Escherichia coli Diarrhea (THREE FC	ORMS):					
Enterotoxigenic  E. coli (ETEC)  Gastroenteritis	Enterotoxigenic strains E. coli	10 to 72 hours, usually 24 to 72 hrs	Watery diarrhea, abdominal cramps, nausea, malaise, low grade fever	Water, semi-soft cheeses, foods requiring no further heating	Stools, rectal swab	Infected workers touching foods, inadequate refrigeration, inadequate cleaning and disinfection of equipment
Enterohemorrhagic E. coli (EHEC) Gastroenteritis	O157:H7 E. coli Verotoxins	3 to 9 days, mean 4 days	Bloody diarrhea, severe abdominal cramping, complications- Hemolytic Uremic Syndrome (HUS), kidney failure	Raw ground beef, raw milk, cheese	Stools, rectal swabs	Infected workers touching foods, inadequate refrigeration, inadequate cooking, inadequate cleaning and disinfection of equipment
Enteroinvasive E. coli (EIEC) Gastroenteritis	Enteroinvasive strains of E. coli	10 to 72 hours	Severe abdominal cramps, watery diarrhea, vomiting malaise, complications – HUS, kidney failure	Raw milk, raw ground beef, cheese	Stools, rectal swabs	Infected workers touching foods, inadequate refrigeration, inadequate cooking, inadequate cleaning and disinfection of equipment
Salmonellosis	Various serotypes of Salmonella from feces of infected humans and other animals	6 to 72 hours, mean 18 to 36 hours	Abdominal pain, diarrhea, chills, fever, nausea, vomiting, malaise	Poultry, meat and their products, egg products, other foods contaminated by salmonellae	Stools, rectal swabs	Inadequate refrigeration, holding foods at warm (bacterial incubation) temperatures, inadequate cooking and reheating, preparing foods several hours before serving, cross contamination, inadequate cleaning of equipment, infected workers touching cooked foods, obtaining foods from contaminated sources
Shigellosis	Shigella flexneri, S. dysenteriae, S. sonnei, & S. boydii from feces of infected humans	24 to 72 hours	Abdominal pain, diarrhea, bloody & mucoid stools, fever	Any contaminated foods, frequently salads, water	Stools & rectal swab	Infected workers touching foods, inadequate refrigeration, inadequate cooking and reheating
Vibrio parahaemolyticus Gastroenteritis	V. parahaemolyticus from sea water or seafoods	2 to 48 hours, mean 12 hours	Abdominal pain, diarrhea, nausea, vomiting, fever, chills, headache	Raw seafoods, shellfish	Stools, rectal swabs	Inadequate cooking, inadequate refrigeration, cross contamination, inadequate cleaning of equipment, using seawater in food preparation
Yersiniosis	Yersinia entero- colitica, Y. psuedo- tuberculosis	24 to 36 hours	Severe abdominal pain, fever, headache malaise, sore throat may mimic appendicitis	Milk, tofu, water, pork	Stools, blood	Inadequate cooking, contamination after pasteurization, contamination of foods by water, rodents, other animals

## VIRAL AGENTS

Astrovirus gastro- enteritis	Astroviruses from human feces	1 to 2 days	Diarrhea, sometimes accompanied by one or more enteric signs or symptoms	Ready-to-eat foods	Stools, acute and convalescent blood	Failure to wash hands after defecation, infected person touching ready-to-eat foods, inadequate cooking or reheating		
Acute viral Gastroenteritis (Small round structured virus)	Norwalk-like viruses, Caliciviruses	1 to 3 days (Norwalk-like virus mean 36 hours)	Nausea, vomiting, abdominal pain, diarrhea, low grade fever, chills, malaise, anorexia, headache	Clams, oysters cockles, green salad pastry, frostings, ice, cut fruit salads	Stools, acute and convalescent blood sera	Polluted shellfish growing waters, poor personal hygiene, infected persons touching prepared foods, foods not requiring further cooking, contaminated waters		
			PARASITIO	CAGENTS				
Amebic Dysentery (Amebiasis)	Entamoeba histolytica from feces of infected humans	5 days to several months; mean 3 to 4 weeks	Abdominal pain, constipation or diarrhea	Raw vegetables and fruit	Stools	Poor personal hygiene, infected workers touching food, inadequate cooking		
Anisakiasis	Anisakis simplex Pseudoterranova decipiens	4 to 6 hours	Stomach pain, nausea, vomiting, abdominal pain, diarrhea, fever	Rock fish, herring, cod, squid	Stools	Ingestion of raw fish, inadequate cooking		
Beef tapeworm infection (Taeniasis)	Taenia saginata from flesh of infected cattle	3 to 6 months	Vague discomfort, hunger pain, loss of weight, abdominal pain	Raw or insufficiently cooked beef	Stools	Lack of meat inspection, inadequate cooking, inadequate sewage disposal, sewage contaminated pastures		
Cryptosporidiosis	Cryptosporidium parvum	1 – 12 days, usually 7 days	Profuse watery dia- rrhea, abdominal pain, anorexia, low grade fever, vomiting	Apple cider, water	Stools, intestinal biopsy	Inadequate sewage or animal waste disposal, contamination by animal manure, contaminated water, inadequate filtration of water		
Cyclosporiasis	Cyclopsora cayetanensis	1 – 11 days, typically 7 days	Prolonged watery diarrhea, weight loss, fatigue, nausea, anorexia, abdominal cramps	Raspberries, lettuce, basil, water	Stools	Sewage contaminated irrigation or spraying water suspected; washing fruits with contaminated water; possibly handling foods that are not subsequently heated		
Fish tapeworm infection (Diphyllobothriasis)	Diphyllobothrium latum from flesh of infected fish	5 to 6 weeks	Vague gastrointest- inal discomfort anemia may occur	Raw or insufficiently cooked fresh water fish	Stools	Inadequate cooking, inadequate sewage disposal, sewage contaminated lakes		
Giardiasis	Giardia lamblia from feces of humans	1 to 6 weeks	Abdominal pain, mucoid diarrhea, fatty stools	Raw vegetables and fruits, water	Stools	Poor personal hygiene, infected workers touching foods, inadequate sewage disposal		
Pork tapeworm infection (Taeniasis)	Taenia solium from flesh of infected swine	3 to 6 months	Vague discomfort, hunger pains, loss of weight	Raw or insufficiently cooked pork	Stools	Lack of meat inspection, inadequate cooking, inadequate sewage disposal, sewage contaminated pastures		
NEU	NEUROLOGICAL SIGNS & SYMPTOMS (VISUAL DISTURBANCES, TINGLING, PARALYSIS) OCCUR							

### INCUBATION (LATENCY) PERIOD USUALLY LESS THAN 1 HOUR FUNGAL AGENTS

	FUNGAL AGENIS						
Ibotenic acid group of mush-room poisoning	Ibotenic acid and and muscinol in some mushrooms	0.5 to 2 hours	Drowsiness and dizziness, state of intoxication, confusion, muscular spasms, delirium, visual disturbances	Amanita muscaria, A. pantherina and related species of mushrooms	Vomitus	Eating Amantia muscaria and related species of mushrooms, eating unknown varieties of mushrooms, mistaking toxic mushrooms for edible varieties	
Muscarine group of mushroom poisoning	Muscarine in some mushrooms	15 minutes to 2	Excessive salivation, perspiration, tearing, reduced blood pressure, irregular pulse, pupils constricted, blurred vision, asthmatic breathing	Clitocybe dealbata, C. rivulosa, and many other species of Inocybe and Boletus mushrooms	Vomitus	Eating muscarine group of mush- rooms, eating unknown varieties of mushrooms, mistaking toxic mush- rooms for edible varieties	
Organophos-phorous poisoning	Organic phosphorous insecticides such Parathion, TEPP, Diazinon, Malathion	Few minutes to few hours	Nausea, vomiting, abdominal cramps, diarrhea, headache, nervousness, blurred vision, chest pain, cyanosis, confusion, twitching, convulsions	Any accidentally contaminated food	Blood, urine, fat biopsy	Spraying foods just before harvesting, storing insecticides in same area as foods, mistaking pesticides for powdered foods	

### TOXIC ANIMALS

Paralytic shellfish Poisoning (PSP)	Saxitoxin and similar toxins from plankton <i>Alexandrium</i> species which are consumed by shellfish	Few minutes to 30 minutes on average, may take up to 2 hrs	Tingling, burning, numbness around lips and finger tips, giddi- ness, incoherent speech, respiratory paralysis, sometimes fatal	Bivalve molluscan shellfish, e.g., clams mussels, viscera of crabs and lobsters	N/A	Harvesting shellfish from waters with a high concentration of <i>Alexandrium</i>
Tetradon poisoning Aka Fugu (puffer Fish) poisoning	Tetrodotoxin from intestines and gonads of puffer type fish	10 minutes to 3 hrs	Tingling sensation of fingers & toes, dizziness, pallor, numbres of mouth and extremities, gastrointestinal symptoms hemorrage and desquamation of skin, eyes fixed, twitching, paralysis, cyanosis sometimes fatal	Puffer-type fish	N/A	Eating puffer-type fish, failure to effect- ively remove intestines and gonads from puffer-type fish if they are to be eaten
Neurotoxic shellfish Poisoning (NSP)	Brevetoxins from from Gymnodinium species	few minutes to few hours	Paresthesia, reversal of hot and cold temperature sensations, nausea, vomiting, diarrhea	Shellfish (mussels, clams) from S.E coastal waters	Gastric washings	Harvesting shellfish from waters with high concentration of <i>Gymnodinium</i> species of dinoflagellates
Amnesic Shellfish Poisoning (ASP) or Domoic Acid	Domoic acid from diatoms (Toxin is heat stable)	30 min. to 24 hrs for gastrointestinal symptoms, neurolog-Ical symptoms within 48 hrs	Initially nausea, vomiting, abdominal pain, diarrhea, neuro- logical signs include: confusion, memory loss, disorientation, seizure, coma, death may occur	Shellfish (mussels, clams), finfish (anchovies), viscera of crabs and lobsters	N.A.	Harvesting shellfish, crabs and finfish from waters which experience plankton blooms releasing domoic acid in the harvesting area
Diarrhetic shellfish Poisoning (DSP)	LISTED PREVIOUSLY					THIS IS NOT A NEUROLOGICAL ILLNESS, BUT IS INCLUDED HERE FOR EASE OF REFERENCE WITH ALL SHELLFISH POISONINGS.
			PLANT TO	XICANTS		
Jimson weed	Tropane alkaloids in Jimson weed	Less than 1 hour	Abnormal thirst, photophobia, distorted sight, difficulty in speaking, flushing, delirium, coma, rapid heart beat	Any part of a plant, tomatoes grafted to Jimson weed stock	Urine	Eating any part of Jimson weed or eating tomatoes from tomato plant grafted to Jimson weed stock
Water hemlock Poisoning	Resin and cicutoxin in hemlock root	15 to 60 minutes	Excessive salivation, nausea, vomiting, Stomach pain, frothing at mouth, irregular breathing, convulsions, respiratory paralysis	Root of water hem- lock Cicuta virosa and C. masculate	Urine	Eating water hemlock, mistaking water hemlock root for wild parsnip, sweet potato or carrot
		INCUI	BATION (LATENCE) CHEMICAL		IOURS	
Chlorinated hydrocarbon poisoning	Chlorinated hydro- carbon insecticides such as aldrin, chlordane, ddt, endrin, lindane, & toxaphene	30 minutes to 6 hrs	Nausea, vomiting, paresthesis, dizziness muscular weakness, anorexia, weight loss, confusion	Any accidentally contaminated food	Blood, urine, stools gastric washings	Storing insecticides in same area as food, mistaking insecticides for powdered food
			TOXIC A	NIMALS		
Ciguatera Poisoning	Ciguatoxin in intestines, roe, gonads & flesh of tropical marine fish	3 to 5 hours, sometimes longer	Tingling & numbness about mouth, metallic taste, dry mouth, gastrointestinal symptoms, watery stools, muscular pain, dizziness, dilated eyes, blurred vision, prostration, paralysis, reversal of hot and cold temperature sensations sometimes fatal	Numerous species of tropical fish		Eating liver, intestines, roe, gonads, or flesh of barracuda, large jacks & amberjacks, grouper and other species of tropical reef fish; usually large reef fish are more commonly toxic

# INCUBATION (LATENCY) PERIOD USUALLY 12 TO 72 HOURS BACTERIAL AGENTS

Botulism	Neurotoxins A, B, E & F of Clostridium botu- linum spores found in soil & animal in- testines	2 hours to 8 days, mean 18 to 36 hrs	Vertigo, double or blur- red vision, dryness of mouth, difficulty in swallowing, speaking and breathing, descending muscular weakness, constipa- tion, pupils dilated or fixed, respiratory par- alysis, gastrointestinal symptoms may precede neurological symptoms. frequently fatal	Home canned low acid foods, vacuum packed fish; fermented fish eggs, fish and marine mammals	Blood, stool	Inadequate heat processing of canned foods and smoked fish, uncontrolled fermentation		
		INCUBATION	(LATENCY) PERIO CHEMICAI	OD GREATER THE LAGENTS	HAN 72 HOURS			
Mercury poisoning	Methyl & ethyl mer- cury compounds from industrial waste and organic mercury in fungicides	1 week or longer	Numbness, weakness of legs, spastic paralysis, impairment of vision, blindness, coma	Grains treated with mercury containing fungicide; pork, fish, & shellfish exposed to mercury compounds	Urine, blood, hair	Streams polluted with mercury compounds, feeding animals grains treated with mercury fungicides, eating mercury treated grains or animals fed such grains		
Triorthocresyl Phosphate Poisoning	Triorthocresyl phosphate used as extracts or as substitute cooking oil	5 to 21 days, mean 10 days	Gastrointestinal symptoms, leg pain, ungainly high stepping gait, foot and wrist drop	Cooking oils, extracts and other foods contaminated with triorthocresyl phosphate	N/A	Using compound as food extractant or as cooking or salad oil		
GE	NERALIZED IN	IFECTION SIGN	IS AND SYMPTC	)MS (FEVER, C	HILL, MALAIS	E, ACHES) OCCUR		
	INCUBATION (LATENCY) PERIOD GREATER THAN 72 HOURS  BACTERIAL AGENTS							
Brucellosis	Brucella abortus, B. melitensis, and B. suis from tissues & milk of infected animals	7 to 21 days	Fever, chills, sweats, weakness, malaise, headache, muscle and joint pain, loss of weight	Raw milk, goat cheese	Blood	Failure to pasteurize milk, livestock infected with brucellae		
Typhoid fever	Salmonella Typhi from feces of infected humans	7 to 28 days, mean 14 days	Malaise, headache, fever, cough, nausea, vomiting, constipation, abdominal pain, chills, rose spots, bloody stools	Shellfish, foods contaminated by workers, raw milk, cheese, watercress, water	Stools, rectal swabs blood	Infected workers touching foods, poor personal hygiene, inadequate cooking, inadequate refrigeration, inadequate sewage disposal, obtaining foods from unsafe sources, harvesting shellfish from sewage contaminated areas		
Listeriosis	Listeria monocyto- genes from soil, manure, silage and environment	3 to 21 days, maybe longer	Low grade fever, flu- like illness, stillbirths, meningitis, enceph- alitis, sepsis, fatalities occur	Cole slaw, milk, cheese, animal products	Blood, urine, cerebrospinal fluid	Inadequate cooking, failure to properly pasteurize milk, prolonged refrigeration, immunosuppressed, pregnant, aged persons, and neonates are at high risk		
Vibrio vulnificus Septicemia	Vibrio vulnificus from sea water	16 hr mean < 24 hr	Malaise, chills, fever, prostration, cutaneous lesions, fatalities occur	Raw shellfish and crabs	Blood	Eating raw shellfish, inadequate cooking, persons with liver damage are at high risk		
			VIRALA	GENTS				
Hepatitis A (Infectious hepatitis)	Hepatitis A virus from feces, urine, blood of infected humans and other primates	10 to 50 days, mean 25 days	Fever, malaise, lassi- tude, anorexia, nausea, abdominal pain, jaundice	Shellfish, any food contaminated by hepatitis viruses, water	Urine, blood	Infected workers touching foods, poor personal hygiene, inadequate cooking, harvesting shellfish from sewage contaminated waters, inadequate sewage disposal		
(Note: Hepatits E is a	an emerging viral pathogen	n. It has similar incubation	periods and symptoms as F	Iepatitis A and can be tran	smitted in foods.)			
			PARASITIC	CAGENTS				
Angiostrongy- laisis (eosino- philic meningoen- cehplalitis)	Angiostrongylus cantonensis (rat lung worm) from rodent feces and	14 to 16 days	Gastroenteritis, head- ache, stiff neck and back, low-grade fever	Raw crabs, prawns, slugs, shrimp & snails	Blood	Inadequate cooking, ingesting raw food		

Raw or insufficiently

cooked meat (rare)

Biopsy of lymph

nodes, blood

Fever, headache,

myalgia, rash

cehplalitis)

Toxoplasmosis

rodent feces and

Toxoplasma gondii

from tissue and

flesh of infected

animals

10 to 13 days

soil

Inadequate cooking of meat of sheep,

swine and cattle

Trichinosis

Trichinella spiralis
(roundworm) from
flesh of infected
swine or bear

4 to 28 days, mean 9 days

Gastroenteritis, fever, edema about eyes, muscular pain, chills, prostration, labored breathing

Pork, bear meat, walrus flesh

Muscle biopsy

Eating raw or inadequately cooked pork or bear meat, inadequate cooking or heat processing, feeding uncooked or inadequately heat processed garbage to swine

## ALLERGIC TYPE SYMPTOMS (FACIAL FLUSHING, ITCHING) OCCUR

## INCUBATION (LATENCY) PERIOD LESS THAN 1 HOUR BACTERIAL (AND ANIMAL) AGENTS

Scombroid	Histamine-like su
Poisoning or	stance produced l
Histaminosis	proteus sp. or oth
	bacteria from hist
	dine in fish flesh

ce subced by r other histi-

Few minutes to 1 hr

Headache, dizziness, nausea, vomiting, peppery taste, burning throat, facial swelling and flushing, stomach pain, itching of skin

Tuna, mackerel,
Pacific dolphin
(known as the mahi
on the Pacific coast
of the U.S.), jack,
anchovy, marlin,
swordfish, bluefish,
sometimes from
ripened cheese

Vomitus

Inadequate refrigeration of scombroid fish and improper curing of cheese

### CHEMICALS

Monosodium glutamate (MSG) of mopoisoning	Excessive amounts nosodium glutamate (MSG)	Few minutes to 1 hr	Burning sensation in back of neck, forearms chest, feeling of tightness, tingling, flushing, dizziness, headache, nausea	Foods seasoned with MSG	N/A	Using excessive amounts of MSG as flavor intensifier.
Nicotinic acid (niacin) poisoning	Sodium nicotinate used as a color preservative	Few minutes to 1 hr	Flushing, sensation of warmth, itching abdominal pain, puffiness of face and knees	Meat or other food in which sodium nicotinate has been added	N/A	Using sodium nicotinate as color preservative
	Dietary supple- ments of niacin used chronically	A few days to a few a few months	Impairment of liver function (elevated transaminases), can result in fulminant liver failure	High potency dietary supplements, especially when used in multiples (500mg or more per day)	N/A	Dietary supplements of niacin can cause similar acute symptoms as niacin, but seldom does because of infrequent use at high doses

## INCUBATION (LATENCY) PERIOD 1 TO 6 HOURS TOXIC ANIMALS

Hypervitaminosis A	Vitamin A contain- ing foods or dietary supplements	Acute: 1 to 6 hours	Headache, gastroin- testinal symptoms, dizziness, collapse, convulsions, desqua- mation of skin	Liver & kidney of arctic mammals	Blood	Eating liver & kidney from cold region animals
		Chronic: days to months or years	Chronic use can cause liver disease, including cirrhosis	High potency die- tary supplements, especially with chronic use	N/A or Blood?	Chronic usage of dietary supplements containing 25,000 IU vitamin A or more per day

- 1. Symptoms and incubation periods will vary with the individual and group exposed because of resistance, age, and nutritional status of individuals, number of organism or concentration of poison in ingested foods, amount of food ingested, pathogenicity and virulence of strains of microorganisms or toxicity of chemical involved. Several of the illnesses are manifested by symptoms in more than one category and have an incubation range that overlaps the generalized categories.
- 2. A more detailed review can be found in:
  - A. Bryan, F.L. 1982, Diseases Transmitted by Foods (A classification and summary), second edition, Centers for Disease Control, Atlanta, GA.
  - B. Rhodehamel, E.J., Editor, 1992, "Foodborne Pathogenic Microorganisms and Natural Toxins", Third Edition, Food and Drug Administration, Washington, D.C.
  - C. Bryan, F.L., Chairman, Committee on Communicable Diseases Affecting Man, 1999, "Procedures to Investigate Foodborne Illness" Fifth edition, International Association of Milk, Food, and Environmental Sanitarians, Inc., Ames, IA
- 3. Samples of any of the listed foods that have been ingested during the incubation period of the disease should be collected.
- 4. Carbon monoxide poisoning may simulate some of the diseases listed in this category. Patients who have been in closed care with motors running or have been in rooms with improperly vented heaters are subject to exposure to carbon monoxide.